Art. XXII.—*Principles of Medicine: comprising General Pathology and Therapeutics, and a brief General View of Etiology, Nosology, Semeiology, Diagnosis, Prognosis, and Hygienics.* By Charles J. B. Williams, M. D., F. R. S., Fellow of the Royal College of Physicians, etc. etc. Edited, with Additions, by Meredith Clymer, M. D., etc. etc. Fourth American edition, revised. Philadelphia: Blanchard & Lea, 1853. 8vo. pp. 476.

With this very able treatise the medical profession are now perfectly familiar, and have very generally evinced their appreciation of its merits. It will be unnecessary, therefore, in announcing the appearance of this fourth American edition, to enter into an examination of the manner in which the author has fulfilled the task assumed by him, that of presenting a fair abstract of the present state of our knowledge in reference to the several subjects it embraces.

The chief aim of Dr. Williams appears to have been, to present those facts within the domain of his general subject which have been the most fully verified, and those deductions that seem the most tenable, excluding all doubtful observations, and a host of discordant opinions little calculated to improve our acquaintance with the true principles of medicine.

The work, though it embraces a candid exposition of the labours of all those who have contributed most to the improvement of the departments of general pathology and therapeutics, is not to be viewed in the light of a mere compilation. Its pages present many facts derived from the author's own observations, and views original with him; which latter, even though occasionally in opposition to those held by distinguished cultivators of the same fields of inquiry, are deserving of a careful and candid consideration.

Taken as a whole, the treatise will be found a faithful guide to the student, and a useful book of reference for the practitioner. D. F. C.

Art. XXIII.—*The Action of Medicines in the System; or, "On the Mode in which Therapeutic Agents introduced into the Stomach produce their peculiar Effects on the Animal Economy." Being the Prize Essay to which the Medical Society of London awarded the Fothergillian Gold Medal for* MDCCCLII. By Frederick William Headland, B. A., M. R. C. S., etc. Philadelphia: Lindsay & Blakiston, 1853. 8vo. pp. 560.

The inquiry to which the present dissertation is devoted, is confessedly a most important one. As the author very properly remarks: "For the proper perfection of medicine as a rational science, two things are in the main needed; the first is a right understanding of the causes of disease, the second, a correct knowledge of the action of medicines. Should our acquaintance with these two subjects be complete, we should then be able to do all that man could by any possibility effect in the alleviation of human suffering."

It is certainly a mortifying fact that, notwithstanding the rapid advance which most of the departments of medical science have made during the present century, still, in the actual amount of our knowledge of the action of medicines and of their agency in the cure of disease, we do not greatly excel our predecessors. A vast number of new and potent remedies, it is true, have of late years been added to our lists of the materia medica, but still, even of these, the true therapeutic action and application are but imperfectly understood. As well remarked by Dr. Headland:—

"On no question, perhaps, have scientific men differed more than on the theory of the action of medicines. Either facts essentially opposed and incompatible have been adduced by the disagreeing parties; or, which is nearly as common, the same fact has received two distinct and opposite interpretations.

Many hypotheses, when tested, are seen to be grounded on bare assertions, and to be destitute of logical proof; many others are attempted to be established on ill-sustained analogies. Analogy, in such a case as this, may be used to increase a probability already evidenced; but, by itself, it is no proof, for we find often that medicines are capable of producing the same result in very dissimilar ways."

The inquiry into the *modus operandi* of medicines is one of great extent, and beset with many difficulties. "In reasoning as to the probable effects of particular remedies on the human body," says Glassford, in his *Principles of Evidence*, as quoted by our author, "the conditions and circumstances of the latter are so various in different cases, and the number of concomitants which have to be considered in addition to the more obvious facts and symptoms is so great, that the utmost exertion of human sagacity, founded upon the largest induction of particulars which any one mind is capable of embracing and retaining, can do no more than approximate to that real evidence with which the case seems by its proper nature to be susceptible."

In a task at once so extensive and difficult, should it be found that Dr. Headland has failed in its entire and satisfactory execution, he must nevertheless receive our thanks for his zeal and courage in undertaking it; more especially as by the extent to which he has succeeded—the important hints he has thrown out, and his careful collation of the facts bearing directly upon the several points of inquiry embraced in his general subject, he has prepared the way, by following which future labourers may advance still farther in the elucidation of the great problem: In what manner do therapeutic agents act in the removal of disease?

We present the ten propositions laid down by Dr. Headland in relation to the general modes of action of therapeutic agents introduced into the stomach. From these will be perceived the leading conclusions at which he has arrived. They are certainly deserving of a close and favourable consideration, and the last four, to say the least of them, would appear to present a far more accurate basis for the classification of the materia medica than any of those previously adopted:—

"*Proposition* I. That the great majority of medicines must obtain entry into the blood, or internal fluids of the body, before their action can be manifested.

"*Prop.* II. That the great majority of medicines are capable of solution in the gastric or intestinal secretions, and pass without material change, by a process of absorption, through the coats of the stomach and intestines, to enter the capillaries of the portal system of veins.

"*Prop.* III. That those medicines which are completely insoluble in water, and in the gastric and intestinal juices, cannot gain entrance into the circulation.

"*Prop.* IV. That some few remedial agents act locally on the mucous surface, either before absorption, or without being absorbed at all. They are chiefly as follows:—

"*a.* Irritant emetics.
"*b.* Stomach anæsthetics.
"*c.* Irritant cathartics.

"*Prop.* V. That the medicine, when in the blood, must permeate the mass of the circulation, so far as may be required to reach the parts on which it tends to act.

"That there are two possible exceptions to this rule:—

"*a.* The production of sensation or pain at a distant point.
"*b.* The production of muscular contraction at a distant point.

"*Prop.* VI. That while in the blood the medicine may undergo changes, which in some cases may, in others may not, affect its influence. That these changes may be:—

"*a.* Of combination.
"*b.* Of reconstruction.
"*c.* Of decomposition.

"*Prop.* VII. That a first class of medicines, called Hæmatics, act while in the blood, which they influence. That their action is permanent.

"1. That of these, some, called Restoratives, act by supplying, or causing to be supplied, a material wanting; and may remain in the blood.

"2. That others, called Catalytics, act so as to counteract a morbid material or process; and must pass out of the body.

"*Prop.* VIII. That a second class of medicines, called Neurotics, act by passing from the blood to the nerves or nerve-centres, which they influence. That they are transitory in action.

"1. That of these, some, called Stimulants, act so as to exalt nervous force, in general or in particular.

"2. That others, called Narcotics, act so as first to exalt nervous force, and then to depress it; and have also a special influence on the intellectual part of the brain.

"3. That others again, called Sedatives, act so as to depress nervous force, in general or particular.

"*Prop.* IX. That a third class of medicines, called Astringents, act by passing from the blood to muscular fibre, which they excite to contraction.

"*Prop.* X. That a fourth class of medicines, called Eliminatives, act by passing out of the blood through the glands, which they excite to the performance of their functions."

The correctness of the first six of these propositions will, we think, be very generally admitted. The last four will probably meet with more opposition; and yet, as the basis of a general classification of remedies, they appear to us to have strong claims to our attention. The greatest difficulty is to decide which of the several articles of the materia medica are to be arranged in one or other of these classes. In regard to many, their proper position is very evident; in regard to others this, however, is by no means so readily determined. The difficulty has been felt by Dr. Headland, who has laboured to overcome it with a good deal of skill and some success.

The first class of medicines—Hæmatics—Dr. H., as we have seen, divides into *restoratives* and *catalytics*. With respect to the first, he remarks that what is stated in the general proposition with respect to their action, resolves itself into the following simple affirmations or minor propositions.

"1. That they act in the blood, and that their effect is permanent.

"2. That there are naturally in the blood substances which resemble or coincide with them.

"3. That they are not of necessity excreted, but may remain in the blood.

"4. That they are of use when a disease depends on the want of one or more materials in the blood."

The restoratives are divided into six orders.

1. Aliments. 2. Acids. *Mineral:* Sulphuric, hydrochloric, nitric, and phosphoric. *Vegetable:* Acetic, citric, tartaric, and malic. 3. Alkalies—Potash, soda, ammonia, lime, magnesia; their carbonates, and neutral acetates, citrates, and tartrates. 4. Tonics—*Alkaloids* and neutral principles—quinia, cinchonia, bebeerine, narcotine, salicine, etc. *Bitter drugs*—cinchonia, quassia, cusparia, gentian, calumba, chiretta, centaurium, meyanthes, rhubarb, hops, elm and willow barks, tansy, wormwood, chamomile, cascarilla. 5. Chalybeates—protoxide, sesquioxide, and sesquichloride of iron. Salts of iron, viz: the carbonate, protosulphate, persulphate, phosphate, pernitrate, peracetate, ammonio-citrate, potassio-tartrate, vinum ferri, chalybeate waters. 6. Solvents—*Antilithics.* The mineral alkalies, their carbonates, and neutral salts, with vegetable acids. Biborate and phosphate of soda. Benzoic and cinnamic acids. Antiphosphatics—mineral and vegetable acids. Sour fruits.

The second division of hæmatics, the catalytics, Dr. H. distributes into eight orders. The statement in the general proposition in reference to these remedies, may be divided, he remarks, into the following minor propositions:—

"1. That they act in the blood, and that their effect is permanent.

"2. That each of itself tends to work out a peculiar operation in the blood.

"3. That the diseases in which they are used depend on certain morbid materials, or actions in the blood.

"4. That the result of the action of a catalytic medicine is in some way to neutralize or counteract some one or more of these morbid processes.

"5. That these medicines are all unnatural to the blood, and must at length pass out of the system."

The eight orders of catalytics, are as follows: 1. ANTIPHLOGISTICS—Antimonials, mercurials, alkalies, salines. 2. ANTISYPHILITICS—Mercurials, preparations of gold, iodide of potassium, sarsaparilla (?). 3. ANTISCROFULITICS—Iodine, bromine, chlorine, iodides and bromides, potash. 4. ANTIARTHRITICS—Colchicum, nitro-hydrochloric acid, lemon-juice. 5. ANTISCORBUTICS—Citric acid, lemon-juice, fresh vegetables, salts of potash (?). 6. ANTIPERIODICS—Arsenious acid, arsenite of potash, alum, chloride of sodium. 7. ANTICONVULSIVES—Preparations of arsenic, silver, zinc, lead, and copper. 8. ANTISQUAMICS—(*Removers of skin disease*)—Preparations of arsenic, sulphur, pitch.

Of the second class of remedies, or NEUROTICS, Dr. H., as we have seen, makes three general divisions: *Stimulants, narcotics,* and *sedatives.*

The minor propositions in reference to neurotics are thus stated:—

"1. That neurotics are medicines which pass into the blood.

"2. That their action is evidenced by a change in one or more of those functions which are attributed to the nervous system.

"3. That it is necessary that they should pass from the blood to that part of the nervous system which is influenced by them.

"4. That they are of use in an over-excited or depressed state of the nervous system.

"5. That they are transitory in action, and cannot remain in the blood."

The STIMULANTS, Dr. H. divides into *general* and *specific.*

The general stimulants are, *Mineral substances:* Ammonia and its carbonates, phosphorus. *Animal substances*—Musk and castor. *Vegetables containing volatile oils*—The aromatic labiatæ, compositæ, and umbelliferæ, cloves and nutmeg, cinnamon, cassia, sassafras, rue, barosma, the aurantiaceæ, canella, valerian, mustard, cajeput and pimenta, hops, juniper, turpentine, cardamom, onion. *Vegetables containing acrid principles*—Senega, horseradish, serpentary, cascarilla, pepper, contrayerva, ginger, capsicum, mezereon. *Resinous substances*—Guaiacum, mastich, olibanum, myrrh, elemi, benzoin, storax, pine resin.

The special stimulants are, strychnia, brucia, toxicodendron, ergot of rye, borax, rue.

NARCOTICS are divided into three orders—*Inebriants, soporifics,* and *deliriants.* As inebriants, Dr. H. enumerates alcohol, wine, ethers, chloroform, camphor, Indian hemp, tobacco, lobelia. As soporifics—opium, lactuca, hops, nutmegs. As deliriants—hyoscyamus, belladonna, stramonium.

SEDATIVES are divided into two orders—*General* and *specific.* As general sedatives, are enumerated hydrocyanic acid, creasote, aconite, conium, colchicum, tea, and coffee. As special sedatives—antimonials, ipecacuanha, digitalis.

The third class of medicines are the ASTRINGENTS.

The general proposition in reference to the action of these remedies, Dr. H. divides into four minor propositions:—

"1. That they are medicines which pass into the blood.

"2. That they have the power of causing the contraction of muscular fibre, living or dead.

"3. That their operation is to diminish secretion, to repress hemorrhage, and to give tone to the muscular system.

"4. That these results are to be accounted for by their action on muscular fibre, to which they pass from the blood."

They are divided into two orders—*Mineral* and *vegetable.*

The *mineral astringents* are, sulphuric, nitric, and hydrochloric acids; acetate and diacetate of lead, sulphate and sesquichloride of iron, alum, sulphate of zinc, sulphate of copper, bichloride of mercury, nitrate of silver. The *vegetable astringents* are, tannic acid, gallic acid, kino, catechu, logwood, oak-galls, rhatany, bistort, pomegranate rind, rose leaves, uvæ ursi, tormentil, and creasote.

The general proposition in reference to the action of the fourth class of remedies, the ELIMINATIVES, is divided into five minor propositions by Dr. H.:—

"1. That eliminatives are medicines which pass into the blood.

"2. That they cannot remain there, but must pass out of the body.

"3. That in so doing, they tend to pass out by some glands more than by others.

"4. That the result of their passage through a gland is to increase its secretion.

"5. That they are of use when the state of the system requires that the function of a gland should be restored or promoted."

The eliminatives are divided into six orders—*Sialagogues, expectorants, cathartics, cholagogues, diaphoretics, diuretics.*

Of sialagogues, mercury is the most important. In some rare cases, salivation has followed the administration of iodine. It is also not an unfrequent symptom of chronic poisoning by lead.

As *expectorants*, Dr. H. thinks that we may class antimony, ipecacuanha, and squill. The chief volatile expectorants enumerated by him are turpentine, camphor, alcohol, ether, and the volatile oils of onions, fennel, assafœtida, caraway, cinnamon, and anise.

Cathartics Dr. H. divides into three groups:—

"1. Mercurials, which tend to increase all secretions. 2. Some resins, oils, and acrid principles, which tend especially to the bowels; and 3. Salines, when given in such an amount that they cannot pass off by the kidneys."

Of *cholagogues*, Dr. H. remarks:—

"We are not well informed as to the exact number of medicines which pass out into the secretion of bile, and act thus on the true eliminative plan. But there is no medicine which is of such great and universal utility in all liver diseases as mercury, in its various forms." "It is probable that alkalies and fatty matters may act in certain cases as true cholagogues, for they are both contained in the natural secretion of bile, and, therefore, likely to pass into it."

Under the head of *true diaphoretics*, Dr. H. remarks as follows:—

"The following groups of medicines may be briefly noticed as tending to act as eliminatives on the glands of the skin. Five divisions may be made:—

"1. Salines and diluents, under certain circumstances. 2. Volatile substances which are soluble in air, as ammonia, volatile oils, and alcohol. 3. Certain acrid matters, as guaiacum. 4. Certain narcotics, as opium and camphor. 5. Antimony, mercury, and sulphur."

The *diuretics* are arranged in four groups: 1. Water, and soluble mineral substances, *i.e.* acids, alkalies, and salines under certain conditions. 2. Acrid matters of various kinds—cantharides, juniper, turpentine, cajeput, copaiba, horseradish. Others of this group contain peculiar vegetable principles, as broom, chimaphila, taraxacum, colchicum, and squill. 3. Alcoholic and ethereal liquids. 4. The minerals which increase all secretions, as mercury, antimony, and iodine.

"There are," Dr. H. remarks, "two chief actions for which diuretics may be required. They may be used: (1) to eliminate solid materials from the blood; (2) to promote absorption, by diminishing the amount of fluid in the blood. It is easier to employ the first than to exert the second of these operations."

The foregoing sketch will enable our readers to form some idea of the views advanced by Dr. H. in the dissertation before us. The leading outlines of his theory of the action of medicines is no doubt correct, though it will probably be found that he has not always succeeded in applying it to explain the entire *modus operandi* of certain articles of the materia medica. We recommend the work as one replete with information on a subject in relation to which there has heretofore been too much vague conjecture and hypothetical speculation. From a careful perusal of Dr. H.'s treatise, the practitioner cannot fail to derive many hints in reference to the therapeutic action of the leading remedial agents calculated to divest their employment of much of the empiricism by which it is now characterized, and at the same time to render their curative operation more prompt and certain. D. F. C.